DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the reformer temperature control system of a fuel cell power plant.
[0002]
[Description of the Prior Art]It has the reformer 01, the fuel cell body 02, and the inverter 03, and the reformer temperature control system of the conventional fuel cell power plant is constituted, as shown in the system configuration figure of the conventional example of drawing 6.
[0003]The raw-materials-and-mineral-fuel feed pipe 04 which supplies the raw materials and mineral fuel containing hydrocarbon, such as town gas, is connected to the reformer 01. The off-gas feed pipe 06 which the refining burner 05 is formed in the reformer 01, and supplies the off-gas from the fuel cell body 02 to the refining burner 05, The combustion air feed pipe 08 which infixed the blower 07 is connected, and by burning the off-gas from the fuel cell body 02 by the refining burner 05, it is constituted so that the reformed gas which uses as the main ingredients the hydrogen which obtains reaction fever and is supplied to the fuel cell body 02 may be generated.
[0004]In the inverter 03, the dc output from the fuel cell body 02 is changed into an ac output. 09 in a figure shows the heat exchanger for preheating which preheats combustion air with the exhaust gas from the reformer 01.
[0005]While the bypass piping 010 is connected to the combustion air feed pipe 08 in parallel with the heat exchanger 09 for preheating, the 1st flow control valve 011 is infixed in the bypass piping 010. The 2nd flow control valve 012 that controls the raw-materials-and-mineral-fuel amount of supply is infixed in the raw-materials-and-mineral-fuel feed pipe 04.
[0006]While the temperature sensor 013 which measures the temperature is formed in the

reformer 01 and the temperature sensor 013 is connected to it at a controller (not shown), As the 1st and 2nd flow control valves 011 and 012 are connected with a controller and it is shown in the graph of correlation with the reformer temperature of (a) of drawing 7, and a control output, It is constituted so that the temperature measured with the temperature sensor 013 may become a desired value, and the temperature of combustion air and the amount of supply of raw materials and mineral fuel may be controlled. On the other hand, in the inverter 03, the direct current before changing into exchange was adjusted, and as shown in the graph of correlation with a direct current of (b) of drawing 7, and the amount of supply of raw materials and mineral fuel, about the flow of raw materials and mineral fuel, it was adjusting, so that the generation output from the fuel cell body 02 might become fixed.

[0007]

[Problem(s) to be Solved by the Invention]Although adjusted, in the former, the temperature of the reformer 01 However, the temperature control of combustion air and amount-of-supply control of raw materials and mineral fuel, In order to relate mutually control of the generation output from the fuel cell body 02, etc., to have to control and to stabilize control, sufficient regulation was required, and there was a fault which a control system becomes complicated and becomes expensive.

[0008]The invention where this invention is made in view of such a situation and which relates to claim 1, composition -- an object of the invention which relates to claim 2 for the purpose of making it simply and cheap and enabling it to adjust the temperature of a reformer is to enable it to adjust the temperature of a reformer with more sufficient accuracy corresponding to change of a generation output.

[0009]

[Means for Solving the Problem]A fuel cell body which makes hydrogen and oxygen react and is made to generate electrical and electric equipment in order that an invention concerning claim 1 may attain the above purposes, A reformer which generates reformed gas which uses as the main ingredients hydrogen which obtains reaction fever and is supplied to said fuel cell body by burning off-gas from said fuel cell body, In a reformer temperature control system of a fuel cell power plant provided with an inverter which changes a dc output from said fuel cell body into an ac output, A direct-current controller which controls a direct-current value to said inverter, and a temperature sensor which measures temperature of said reformer, Target temperature set to a target temperature setting means which sets up target temperature of said reformer, and temperature measured with said temperature sensor by said target temperature setting means is measured, When measurement temperature is higher than target temperature, a direct-current value is made to increase, and a direct-current value control means which controls said direct-current controller to decrease a direct-current value when measurement temperature is lower than target temperature is had and constituted.

[0010]In order that an invention concerning claim 2 may attain the above purposes, In a reformer temperature control system of the fuel cell power plant according to claim 1, A flow control means which adjusts the amount of supply of raw materials and mineral fuel supplied to a reformer, and an ac output desired value setting-out means to set a desired value of an ac output from an inverter to enabled change setting out, It corresponds to a desired value of said ac output set up by said ac output desired value setting-out means, A raw-materials-and-mineral-fuel amount-of-supply setting-out means to set up the amount of supply of raw materials and mineral fuel so that the amount of supply of raw materials and mineral fuel supplied to a reformer may increase, and a raw-materials-and-mineral-fuel amount-of-supply control means which controls said flow control means to become the amount of supply of raw materials and mineral fuel set up by said raw-materials-and-mineral-fuel amount-of-supply setting-out means are had and constituted, so that said desired value is large.

[0011]

[Function]According to the composition of the reformer temperature control system of the fuel cell power plant of the invention concerning claim 1, when the temperature of a reformer is higher than target temperature, A direct-current value is made to increase by a direct-current value control means, the quantity of the reformed gas consumed with a fuel cell body can be made to be able to increase, the quantity of the off-gas which is taken out from a fuel cell body and supplied to a reformer can be decreased, the gas volume which burns with a reformer can be decreased, the temperature of a reformer can be reduced, and it can bring close to target temperature. On the other hand, when the temperature of a reformer is lower than target temperature, A direct-current value is decreased by a direct-current value control means, the quantity of the reformed gas consumed with a fuel cell body is decreased, the quantity of the off-gas which is taken out from a fuel cell body and supplied to a reformer is increased, the gas volume which burns with a reformer is increased, the temperature of a reformer is raised, and it can bring close to target temperature.

[0012]According to the composition of the reformer temperature control system of the fuel cell power plant of the invention concerning claim 2. According to a consumer's electric operating condition etc., follow on setting up the desired value of the ac output from an inverter, and it corresponds to the desired value, The amount of supply of raw materials and mineral fuel can be set up with a feedforward control system so that a desired value is large, and the amount of supply of the raw materials and mineral fuel supplied to a reformer may increase, and the temperature of a reformer can be brought close to target temperature by the established state by control of the direct-current value by a direct-current value control means.

[0013]

[Embodiment of the Invention]Next, the example of this invention is described in detail based on a drawing. Drawing 1 is a block diagram with which explanation of the 1st example of the

reformer temperature control system of the fuel cell power plant concerning this invention is presented.
It has the reformer 1, the fuel cell body 2, and the inverter 3, and the fuel cell power plant is constituted.

[0014]The raw-materials-and-mineral-fuel feed pipe 4 which supplies the raw materials and mineral fuel containing hydrocarbon, such as town gas, is connected to the reformer 1. The off-gas feed pipe 6 which the refining burner 5 is formed in the reformer 1, and supplies the off-gas from the fuel cell body 2 to the refining burner 5, The combustion air feed pipe 8 which infixed the blower 7 is connected, and by burning the off-gas from the fuel cell body 2 by the refining burner 5, it is constituted so that the reformed gas which uses as the main ingredients the hydrogen which obtains reaction fever and is supplied to the fuel cell body 2 may be generated.
[0015]In the inverter 3, the dc output from the fuel cell body 2 is changed into an ac output. Nine in a figure shows the heat exchanger for preheating which preheats combustion air with the exhaust gas from the reformer 1.
[0016]As the temperature sensor 10 which measures the temperature to the reformer 1 is formed and it is shown in the block diagram of drawing 2, while the temperature sensor 10 is connected to the controller 11, The target temperature setting means 12 and the ac output desired value setting-out means 13 are connected to the controller 11, and the direct-current controller 14 of the inverter 3 and the flow control valve 15 as a flow control means provided in the raw-materials-and-mineral-fuel feed pipe 4 are connected further. The controller 11 is equipped with the direct-current value control means 16, the raw-materials-and-mineral-fuel amount-of-supply setting-out means 17, and the raw-materials-and-mineral-fuel amount-of-supply control means 18.
[0017]In the target temperature setting means 12, the target temperature which should control the reformer 1 is set up beforehand. In the ac output desired value setting-out means 13, the desired value of the ac output from the inverter 3 is set up according to a consumer's electric operating condition etc. to have called it 100W, 200W, etc.
[0018]Based on the target temperature of the reformer 1 set up in the direct-current value control means 16 by the temperature and the target temperature setting means 12 of the reformer 1 measured with the temperature sensor 10, as shown in the graph of correlation with the temperature of the reformer of (a) of drawing 3, and a direct current, Output a control signal to the direct-current controller 14, when measurement temperature is higher than target temperature, a direct-current value is made to increase, and it is constituted so that a direct-current value may be controlled to decrease a direct-current value when measurement temperature is lower than target temperature.

[0019]In the raw-materials-and-mineral-fuel amount-of-supply setting-out means 17, beforehand, corresponding to the desired value of an ac output, the amount of supply of raw materials and mineral fuel is set up, and it is remembered that the amount of supply of the raw materials and mineral fuel supplied to the reformer 1 increases, so that a desired value is large.
[0020]The opening of the flow control valve 15 required in the raw-materials-and-mineral-fuel amount-of-supply control means 18 to obtain the raw-materials-and-mineral-fuel amount of supply inputted from the raw-materials-and-mineral-fuel amount-of-supply setting-out means 17 is computed, As the opening control signal for obtaining the calculation opening is outputted to the flow control valve 15 and it is shown in the graph of correlation with the ac output preset value of (b) of drawing 3, and the amount of supply (flow of town gas) of raw materials and mineral fuel, Setting-out control of the amount of supply of raw materials and mineral fuel is carried out so that the desired value of the ac output set up by the ac output desired value setting-out means 13 may be acquired by feed-forward control.
[0021]As opposed to the desired value of the ac output which the above-mentioned composition shows beforehand according to a consumer's electric operating condition etc., When the temperature of the reformer 1 is higher than target temperature to a change minute [after the setting out] which sets up the amount of supply of raw materials and mineral fuel with the feedforward control system, And also in any when lower than target temperature, it is based on the temperature of those reformers 1, a direct-current value is increased or decreased by the direct-current value control means 16, and the temperature of the reformer 1 can be controlled.
[0022]If the above-mentioned control mode is explained, as shown in the graph of the change with time of the control mode of the ac output preset value of (c) of drawing 3, the amount of supply (town gas flow) of raw materials and mineral fuel, and a direct-current value, When an ac output preset value increases, the flow of town gas is made to increase, and a direct-current value is made to increase with the direct-current controller 14 continuously. The speed of change is the turn of an ac output preset value, a town gas flow, and a direct-current value. On the contrary, if an ac output preset value decreases, a direct-current value will be decreased and the flow of town gas will be decreased. The speed of change in this case is almost simultaneous with an ac output preset value and a direct-current value, and it serves as a town gas flow continuously.
[0023]Drawing 4 is a block diagram with which explanation of the 2nd example of the reformer temperature control system of the fuel cell power plant concerning this invention is presented. A different place from the 1st example is as follows.
Namely, as the 1st, 2nd, and 3rd opening and closing valves 21, 22, and 23 that changed the maximum opening mutually in the raw-materials-and-mineral-fuel feed pipe 4 are formed and it

is shown in the graph of correlation with the load of (a) of drawing 5, and an ac output preset value (output setting out), Where only the 1st opening and closing valve 21 is opened, a rated load state is acquired, where only the 2nd opening and closing valve 22 is opened, a middle output state is acquired, and a standby state is acquired where only the 3rd opening and closing valve 23 is opened.

[0024]As this is shown in the graph of correlation with the ac output preset value of (b) of drawing 5, and the amount of supply (town gas flow) of raw materials and mineral fuel, while setting up a three-stage as an ac output preset value, corresponding to it, the supply state of the raw materials and mineral fuel of a three-stage is acquired. Other composition is the same as the 1st example, and the explanation is omitted by attaching the same drawing number.

[0025]

[Effect of the Invention]According to the reformer temperature control system of the fuel cell power plant of the invention concerning claim 1, so that clearly from the above explanation. Only by being based on the temperature of those reformers, and increasing or decreasing a direct-current value by a direct-current value control means also in any when the temperature of a reformer is higher than target temperature, and when lower than target temperature, since the temperature of a reformer is controlled, the system of measurement which attaches while a control system becomes easy also becomes easy -- composition -- it can be easy, it is made cheap and the temperature of a reformer can be adjusted.

[0026]According to the reformer temperature control system of the fuel cell power plant of the invention concerning claim 2, the desired value of the ac output beforehand known according to a consumer's electric operating condition etc. is received, Set up the amount of supply of raw materials and mineral fuel with the feedforward control system, and to the minute change after the setting out only by increasing or decreasing control of the direct-current value by a direct-current value control means, Since the temperature of a reformer is controlled, the temperature of a reformer can be adjusted with more sufficient accuracy corresponding to change of a generation output.

[Translation done.]